

CLAIMS

1. A numerically controlled machine tool for machining a workpiece mounted on a workpiece support unit by moving a spindle having a tool mounted thereon in directions along an X-axis, a Y-axis and a Z-axis with respect to the workpiece, said machine tool comprising:

5 a spindle support structure including a base adapted to be located on a floor surface and having guides extending in the direction along the X-axis on the upper and lower portions thereof, an X-axis slider guided along the guides on the upper and lower portions of said base to move from side to side in the direction along the X-axis, a Y-axis slider guided to move upwardly and downwardly in the direction along the Y-axis on said X-axis slider, a Z-axis slider guided to move forwardly and backwardly in the direction along the Z-axis on said Y-axis slider, and a spindle head fixedly mounted on said Z-axis slider or mounted to be rotatable in at least one of directions along an A-axis, a B-axis and a C-axis;

15 20 a workpiece support structure including a base having shaft support means located at the opposing ends thereof along the X-axis, and a workpiece mounting table supported by said shaft support means to allow for rotational indexing about a horizontal axis extending in the direction along the X-axis, said workpiece mounting table having at least one workpiece mounting surface; and

25 30 a chip discharge means located between said spindle support structure and said workpiece support structure for discharging chips produced in the machining area to the outside of said machining area.

35 2. The numerically controlled machine tool according to claim 1, wherein said base of said spindle support structure comprises an extended base having a plurality of base units coupled to each other along the X-axis, said base unit having a predetermined X-axis unit length, and

said workpiece support structure comprises

an extended workpiece support structure having a plurality of workpiece support structure units coupled to each other along the X-axis with the horizontal axes thereof aligned, said workpiece support structure having a predetermined X-axis unit length.

5           3. The numerically controlled machine tool according to claim 1, wherein said X-axis slider of said spindle support structure is driven in the direction along the X-axis by linear motors disposed along said 10 guides on the upper and lower portions of said base, respectively, and

15           said linear motor includes a stator and a mover arranged on said base and said X-axis slider, respectively, in opposed relation to each other so that an attraction force of said stator acting on said mover reduces the load in gravitational direction exerted on 20 said guide of said X-axis slider.

25           4. The numerically controlled machine tool according to claim 1, wherein said base of said spindle support structure has longitudinal spaces extending in the direction along the X-axis and opening downwardly in the upper and lower portions of said base, respectively, and each of said longitudinal spaces accommodates therein a guide for guiding and supporting said X-axis slider and an X-axis feed means for moving said X-axis slider in the direction along the X-axis.

30           5. The numerically controlled machine tool according to claim 1, wherein said workpiece mounting table of said workpiece support structure is formed into a shape of a substantially triangle pole having three workpiece mounting surfaces extending in parallel to the horizontal axis in the direction along the X-axis.

35           6. The numerically controlled machine tool according to claim 1, wherein said workpiece support structure is provided with a pushing means located between the bottom of said workpiece mounting table and said base for imparting an upward pushing force on said

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workpiece mounting table.

7. A numerically controlled machine tool for machining a workpiece mounted on a workpiece support unit by moving a spindle having a tool mounted thereon in directions along an X-axis, a Y-axis and a Z-axis with respect to the workpiece, said machine tool comprising:

5 a spindle support structure including a base adapted to be located on a floor surface and having guides extending in the direction along the X-axis on the upper and lower portions thereof, an X-axis slider guided along the guides on the upper and lower portions of said base to move from side to side in the direction along the X-axis, a Y-axis slider guided to move upwardly and downwardly in the direction along the Y-axis on said X-  
10 axis slider, a Z-axis slider guided to move forwardly and backwardly in the direction along the Z-axis on said Y-axis slider, and a spindle head fixedly mounted on said Z-axis slider or mounted to be rotatable in at least one of directions along an A-axis, a B-axis and a C-axis;

15 20 a workpiece support structure including a base having shaft support means located at the opposing ends thereof along the X-axis, and a workpiece mounting table supported by said shaft support means to allow for rotational indexing about a horizontal axis extending in the direction along the X-axis, said workpiece mounting table having at least one pallet mounting means for detachably mounting on said workpiece mounting table a pallet for attaching a workpiece thereon;

25 30 a pallet changing means including a pallet stocker located adjacent to said workpiece support structure and a pallet carrier for transporting the pallet between said workpiece mounting table and said pallet stocker; and

35 a chip discharge means located between said spindle support structure and said workpiece support structure for discharging chips produced in the machining area to the outside of said machining area.

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8. A numerically controlled machine tool for machining a workpiece mounted on a workpiece support unit by moving a spindle having a tool mounted thereon in directions along an X-axis, a Y-axis and a Z-axis with respect to the workpiece, said machine tool comprises:

10 a spindle support structure including a base adapted to be located on a floor surface and having guides extending in the direction along the X-axis on the upper and lower portions thereof, an X-axis slider guided along the guides on the upper and lower portions of said base to move from side to side in the direction along the X-axis, a Y-axis slider guided to move upwardly and downwardly in the direction along the Y-axis on said X-axis slider, a Z-axis slider guided to move forwardly and backwardly in the direction along the Z-axis on said Y-axis slider, and a spindle head fixedly mounted on said Z-axis slider or mounted to be rotatable in at least one of directions along an A-axis, a B-axis and a C-axis; and

15 a workpiece rest disposed in the front of said spindle support structure for fixedly mounting a workpiece thereon,

wherein said base of said spindle support structure is provided with longitudinal spaces extending in the direction along the X-axis and opening downwardly in the upper and lower portions of said base, respectively, the guide located in each of said longitudinal spaces for guiding and supporting said X-axis slider, and an X-axis feed means located along said guide in each of said longitudinal spaces for moving said X-axis slider.

9. The numerically controlled machine tool according to claim 8, wherein said X-axis feed means comprises a linear motor including a stator, and said X-axis slider is provided with wiper means for removing dusts or chips attached to said guide and the stator of said linear motor.

## 10. The numerically controlled machine tool

according to claim 8, wherein said X-axis feed means comprises a linear motor including a stator and a mover arranged on said base and said X-axis slider, respectively, in opposed relation to each other so that an attraction force of said stator acting on said mover reduces the load, in the gravitational direction, exerted on said guide of said X-axis slider.